Ramp Rates

[Insert Unit Name]

[Insert Three Letter Code]

Version 0.1



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# DOCUMENT VERSION History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Document Revsion History** | | | | |
| **Revision** | **Date** | **Comment** | **Name** | **Company** |
| 0.1 | Xx/xx/xxxx | XX | User | User |
|  |  |  |  |  |
| 1.0 | Xx/xx/xxxx | Revised to Major version for onsite testing and signoff |  | SONI |

1. **Introduction**

The Unit must submit the latest version of this test procedure as published on the SONI website[[1]](#footnote-1).

All yellow sections must be filled in before the test procedure will be approved. All grey sections must be filled in during testing. If any test requirements or steps are unclear, or if there is an issue with meeting any requirements or carrying out any steps, please contact [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) .

On the day of testing, suitably qualified technical personnel are required on site to assist in undertaking the tests. The personnel shall have the ability to:

1. Set up and disconnect the control system and instrumentation as required;
2. Ability to fully understand the Unit’s function and its relationship to the System;
3. Liaise with CHCC as required;
4. Mitigate issues arising during the test and report on system incidents.

The availability of personnel at CHCC will be necessary in order to initiate the necessary instructions for the test. CHCC will determine:

1. If network conditions allow the testing to proceed.
2. When the tests will be carried out.

On completion of this test, the following shall be submitted to [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) :

|  |  |
| --- | --- |
| **Submission** | **Timeline** |
| A scanned copy of the test procedure, as completed and signed on site on the day of testing | 1 working day |
| Test data in CSV or Excel format | 1 working day |
| Test report | 10 working days |

**Note:**

**The NI Power System is a live, dynamic, constantly changing system on which major changes or disturbances can occur without warning. All testing has the potential to impact the NI Power System and must be treated as such.**

**Prior to testing taking place SONI Control Room must be informed as soon as practically possible. SONI Control Room Staff reserve the right to suspend any testing if it may have a detrimental impact on the NI Power System and/or prevailing system conditions call for it.**

**Tests must be undertaken in accordance with this procedure however should a test in the procedure:**

* **have potential for a detrimental impact on the NI Power System,**
* **result in damage to the Generator’s and/or TO’s Plant and Apparatus,**
* **does not adequately demonstrate Generator Plant performance,**

**an equivalent test procedure or demonstration of Generating Unit capability[[2]](#footnote-2) agreed between SONI and the Generator may be undertaken to validate Grid Code compliance.**

# Abbreviations

CHCC Castlereagh House Control Centre

MEC Maximum Export Capacity

MVAr Mega Volt Ampere – reactive

MW Mega Watt

TSO Transmission System Operator

EDIL Electronic Dispatch Instruction Logger

DCS Distributed Control System

# Unit DATA

|  |  |
| --- | --- |
| Unit Test Coordinator | Unit to Specify Name, Company and contact details. |
| Unit name | Unit to Specify |
| Associated Station | Unit to Specify |
| Unit connection point | Unit to Specify |
| Unit connection voltage | Unit to Specify |
| Unit Fuel Type: | Primary Fuel / Secondary Fuel. |
| Registered Capacity / Maximum Continuous Rating | Unit to Specify |
| Contracted MEC | Unit to Specify |
| Minimum Load | Unit to Specify |
| Ramp Rate setting applied to the unit (per minute) | Unit to Specify |
| 3% MCR | Unit to Specify |
|  |  |

# SONI Grid Code references

|  |  |
| --- | --- |
| Grid Code Version: | Unit to specify |

CC.S1.1.3.9 **Start-Up** and Ramp Rates (Transmission Connected)

CC.S1.2.3.4 **Start-Up** and Ramp Rates (Distribution Connected)

(b) A **Generating Unit** which is in a hot condition must be capable of ramping up from part-load pursuant to a **Dispatch** instruction at a rate of at least 3% of MCR per minute.

(c) A **Generating Unit** must be capable of de-loading at a rate of at least 3% of MCR per minute.

**Glossary:**

|  |  |
| --- | --- |
| **Aggregate Interconnector Ramp Rate** | The maximum **Ramp Up Rate** for an **Interconnector** or maximum **Ramp Down Rate** as determined by the **TSO**. |
| **Max Ramp Down Rate** | The maximum **Ramp Down Rate** of a **Demand Side Unit**. In the case of a **Demand Side Unit** which consists of an **Aggregated Demand Site** this shall be the aggregated maximum **Ramp Down Rate** of the **Individual Demand Sites**. |
| **Max Ramp Up Rate** | The maximum **Ramp Up Rate** of a **Demand Side Unit**. In the case of a **Demand Side Unit** whichconsists of an **Aggregated Demand Site** this shallbe the aggregated maximum **Ramp** |
| **Ramp Down Break Point** | The **MW** level at which the **Ramp Down Rate** changes. There may be circumstances where morethan one parameter applies and this is indicated byadding a number at the end of the parameter. |
| **Ramp Down Rate** | The maximum rate of decrease in a **Generating Unit’**s **Output**. The **Ramp Down Rate** appliesover the output range from its **Contracted Capacity** (for **PPA CDGU**s other than **PPA Open Cycle Gas Turbines**) or **Contracted Capacity (Peak)** (for **PPA Open Cycle Gas Turbines**) or **Registered Capacity** (for non-**PPA** plant) to **Minimum Generation**. The rate of change may not depend upon the initial **Warmth** of the plant but may depend on the **MW Output**. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter. |
| **Ramp Up Break Point** | The MW level at which the **Ramp Up Rate** changes. There may be circumstances where morethan one parameter applies and this is indicated byadding a number at the end of the parameter. **Ramp Up Rate** The maximum rate of increase in a **Generating Unit**’s **Output**. This rate of increase continuesuntil the **Generating Unit** reaches the level ofoutput instructed by the control room operator of its **Contracted Capacity** (for **PPA CDGU**s otherthan **PPA Open Cycle Gas Turbines**) or **Contracted Capacity (Peak)** (for **PPA Open** **Cycle Gas Turbines**) or **Registered Capacity** (for non-**PPA** plant). The rate of increase may not depend upon the initial **Warmth** of the plant but may depend on the **MW Output**. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter. |

# site Safety requirements

The following is required for the SONI witness to attend site:

|  |  |
| --- | --- |
| Personal Protective Equipment Requirements   1. Site Safety boots 2. Hard Hat with chin strap 3. Hi Vis 4. Arc Resistive clothing 5. Safety Glasses 6. Gloves | 1. Yes / No 2. Yes / No 3. Yes / No 4. Yes / No 5. Yes / No 6. Yes / No |
| Site Induction requirements | Yes / No  (If Yes, Unit to specify how and when the induction must carried out) |
| Any further information | Unit to specify |

# Test Description and Pre Conditions

## Purpose

The purpose of the test is to demonstrate the Capability of the Unit to ramp up and down between defined load points at a specified rate.

## Pass Criteria

**Northern Ireland:**

1. The ramp up capability is not less than 3% of MCR per minute when the unit is in normal dispatch condition.
2. The ramp down capability is not less than 3% of MCR per minute when the unit is in normal dispatch condition.

## Instrumentation and Onsite Data Trending

All of the following trends and screenshots must be recorded by the Unit during the test. Failure to provide any of these trends will result in test cancellation.

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Data Trending and Recording** | **Resolution** | **Source** |
| 1 | Active Power at Connection Point (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 2 | Reactive Power at Connection Point (Mvar) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 3 | Active Power at Generator (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 4 | Reactive Power at Generator (Mvar) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 5 | Generator Voltage (kV) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 6. | Other signals as required by the unit or by [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) . | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 7 | Alarm/Event page | Print out alarms / events for duration of the test. | |
| 8 | Generator Overview Screen | Print out at appropriate milestones during the test i.e. Before, during at regular intervals and after test from generator overview page on DCS | |
| 8 | EDIL instructions | Print out as logged during the test. | |

## Initial Conditions and Calculations

Should “No” be answered to any of the following, contact [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) and agree next steps in advance of making any corrective actions.

|  |  |  |
| --- | --- | --- |
| **No.** | **Conditions** | **Check on day of test** |
| 1 | Test Profiles have been submitted and approved by [neartime@soni.ltd.uk](mailto:neartime@soni.ltd.uk) . | Yes/No |
| 2 | Unit Fuel Type: Primary Fuel / Secondary Fuel | Yes/No |
| 3 | Correction curves (Temperature, humidity, atmospheric pressure) have been provided to [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk). | Yes/No |
| 4 | Normal start up support auxiliary systems are aligned and in service. | Yes/No |
| 5 | Required signals, as described in section 7.3 are available | Yes/No |

|  |  |  |
| --- | --- | --- |
| **No.** | **Calculation** | **Calculated on day of test** |
| 1 | Declared availability on day of test | \_\_\_MW |
| 2 | Corrected Registered Capacity | \_\_\_MW |
| 3 | Corrected Minimum load | \_\_\_MW |

# Test Steps

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comment** |
| 1 | Unit operator begins data recording for all trends noted in Section 7.3. |  |  |
| 2 | Unit operator contacts CHCC and requests permission to begin test and a dispatch instruction to minimum load via EDIL. |  |  |
| 3 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at XX MW per minute. |  |  |
| 4 | After reaching minimum load and after **XX minutes** where the unit has stabilised, the Unit operator notes Minimum load value.  This value shall be the maximum sustained value of minimum load achieved over the stabilised period. |  | Minimum Load \_\_\_\_\_MW. |
| 5 | Unit operator requests a dispatch instruction to **XX MW** (95% load) via EDIL from CHCC. |  |  |
| 6 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at **XX MW** per minute. |  | Time of instruction: \_\_:\_\_.  Ramp up Rate of Unit: \_\_\_\_.  Expected time to achieve 95% load: \_\_:\_\_.  Is the ramp rate linear: Yes / No |
| 7 | Unit operator notes the time when **XX MW** (95% load) was achieved.  The Unit remains at **XX MW** for a period of **XX minutes** until the unit has stabilised. |  | Time 95% load was achieved: \_\_:\_\_. |
| 8 | Unit operator contacts CHCC and requests a dispatch instruction to **XX MW** (base load) via EDIL. |  |  |
| 9 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate **at XX MW** **per minute**. |  | Time of instruction: \_\_:\_\_.  Ramp up Rate of Unit: \_\_\_\_.  Expected time to achieve base load: \_\_:\_\_.  Is the ramp rate linear: Yes / No |
| 10 | Unit operator notes the time when **XX MW** (base load) was achieved.  The Unit remains at **XX MW** for a period of **XX minutes** until the unit has stabilised. |  | Time base load was achieved: \_\_:\_\_. |
| 11 | Unit operator contacts CHCC and requests DeSync switching instruction and EDIL instruction if the Unit is required to DeSync. |  |  |
| 12 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at **XX MW per minute**. |  | Time of instruction: \_\_:\_\_.  Ramp up Rate of Unit: \_\_\_\_.  Expected time to DeSync: \_\_:\_\_.  Is the ramp down rate linear: Yes / No |
| 13 | Unit operator notes actual time of DeSync. |  | DeSync Time: \_\_:\_\_ |
| 14 | Unit operator contacts CHCC and informs them that the test is complete. |  |  |
| 15 | Unit operator ends data recording for all trends noted in Section 7.3. |  |  |

|  |
| --- |
| **Comments:** |
| Unit Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date / Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| SONI Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date / Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. <https://www.soni.ltd.uk/how-the-grid-works/grid-codes/conventional-generator-co/index.xml> [↑](#footnote-ref-1)
2. For example simulation of the Generator performance characteristics under the test procedure [↑](#footnote-ref-2)